

Using Information Technology in the modern educational system – Physics- The interference in light

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Abstract. The application is fully interactive, allowing the student to study in a playful way. The visual support allows a better understanding of the phenomena, transforming hours of explanations in just a few minutes.

The animations and the possibility to review them allow the student to provide optimum feedback to the teacher.

Therefore, the teacher has a useful instrument, which completes the classical teaching methods. The virtual experiments not only allow a better description of the phenomena, but also allows the modification of the parameters on which the oscillatory motion.

Keywords. Educational process, IT, innovation, interactivity

1. Introduction

The interference in light is an educational software meant for teaching optical phenomena to high school students. It contains information about:

- stationary and non-stationary waves
- localized interference (Newton's rings, the optical wedge)
- non-localized interference (Young's double slit experiment, the Lloyd mirror, the Fresnel biprism)

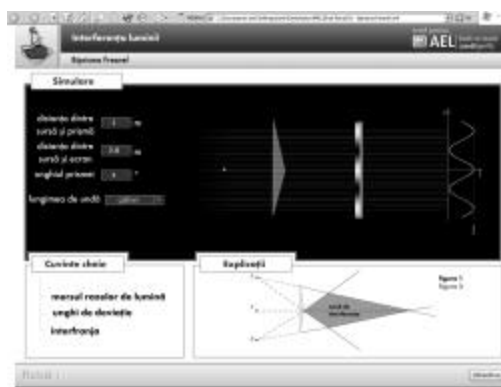


Figure 1. Fresnel's prism

2. Key advantages

The software is entirely interactive and the studies of the interference in light 'a child's play'. The visual support provides a quick understanding of the phenomenon, compressing hours of explanations into several minutes.

Its main advantages are as follows:

- The content is well structured into teaching units, giving the teacher the liberty to devise a lesson that is suited to the level of the classroom.
- The theory of each teaching unit is structured into keywords, providing a clear and thorough educational support.

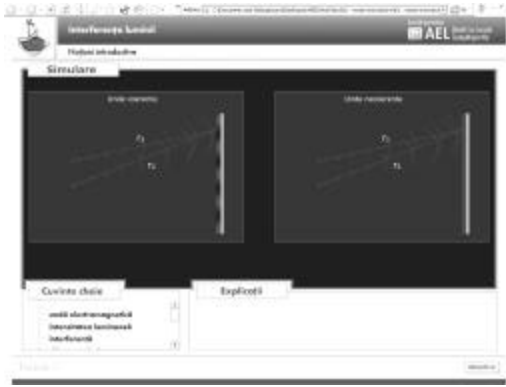


Figure 2. Main interface

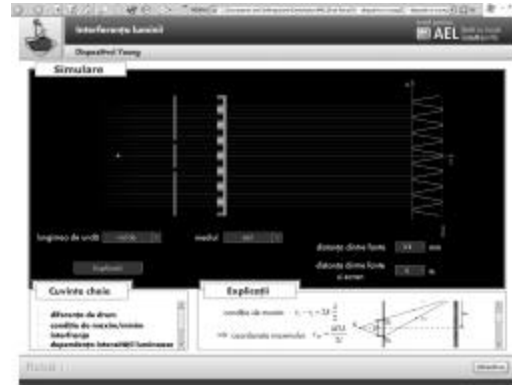


Figure 3. Young's double slit experiment

Each teaching unit includes complex simulations, experiments and animated representations (clear illustration of the dependence between the wave length, the interference figure and the intensity of the light on the screen).

3. Simulations and Experiments

The simulations include actual experiments that would have been impossible without these applications. They comprise the following simulations:

- Young's double slit experiment (Fig. 3), with the possibility of modifying the distances between the different components, the wave length of the light and the environment in which the experiment takes place;
- Fresnel's prism experiment (Fig. 1), with the possibility of modifying the distances between the different parts which comprise the apparatus, the wavelength, as well as the angle of the prisms
- The air wedge experiment (Fig. 4), with the possibility of modifying the angle of the air wedge, as well as the refracting indexes of the material the wedge is made of, but also the refracting indexes of the materials surrounding the wedge



Figure 4. The air wedge



Figure 5. Newton's rings

- Newton's rings experiment (Fig. 5), with the possibility of modifying all the refracting indexes of the materials that comprise the apparatus, but also the wavelength of the light and the radius of the lens

4. Evaluation

Unlike the classical method of evaluation, this software includes a different test: the Lloyd mirror (Fig. 6). The student must place the components of the apparatus accordingly in order to obtain the interference figure on the screen. If he/she does not succeed after three misses, the key words will appear.

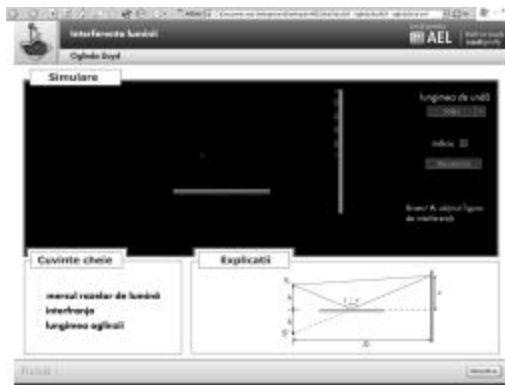


Figure 6. Lloyd's mirror

5. Accessibility and Compatibility

Another advantage is accessibility: a unified, clear and airy interface, in which the stress is on the simulations. It is divided in windows which logically group the content and the functions of the software. All the buttons, links and explanations are intuitive and easy to understand, and the texts are clear and easy to read.

The software is developed in Macromedia Flash MX 2004, therefore this Flash animation can be run in any browser, with a full compatibility with the software or hardware configuration.